

INTERNATIONAL RECTIFIER



# 1N3879, 1N3889, 6FL, 12FL, 16FL SERIES

6A, 12A and 16A Fast  
Recovery Rectifiers

## Major Ratings and Characteristics

	1N3879 -1N3883	1N3889 -1N3893	6FL...	12FL...	16FL...	Unit
$I(F(AV))^\dagger$	6*	12*	6	12	16	A
IFSM	50Hz 60Hz	72 75*	145	110 150	145 190	A
$I_{Zt}$	50Hz 60Hz	26 23	103	60 55	103 94	A <sup>2</sup> s
$\sqrt{I_t}$		363	1452	855	1452	A <sup>2</sup> /s
$T_f$ range			see table			ns
$V_{RRM}$ range		50 - 400*		50 - 1000		V
$T_j$ range			-65 to 150			°C

\* JEDEC registered values.

† At max.  $T_C = 100^\circ\text{C}$ .

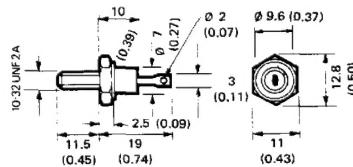
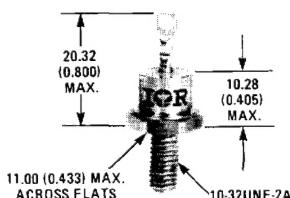
## Description

This range of fast recovery diodes is designed for applications in DC power supplies, inverters, converters, choppers, ultrasonic systems and for use as free wheel diodes.

## Features

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC types
- Stud cathode and stud anode versions
- Types up to 1000V  $V_{RRM}$
- Fully characterised reverse recovery conditions

## CASE STYLE AND DIMENSIONS



Conforms to JEDEC : DO-203AA (DO-4)

IEC 191-2 : A3U

BS 3934 : SO-10A

DIN 41885 : 101 C 2

All dimensions in millimetres (inches)

## REVERSE VOLTAGE RATINGS

Part Number	① ②	VRM — Max. Repetitive Peak Reverse Voltage	VRM — Max. Non-Repetitive Peak Reverse Voltage $t_p \leq 5 \text{ ms}$	IR — Max. Reverse Current At Rated VR		
				T <sub>J</sub> = 25°C	T <sub>J</sub> = 100°C	T <sub>J</sub> = 150°C
1N3879		50	75	0.015*	1.0*	3.0*
1N3880		100	150	0.015*	1.0*	3.0*
1N3881		200	250	0.015*	1.0*	3.0*
1N3882		300	350	0.015*	1.0*	3.0*
1N3883		400	450	0.015*	1.0*	3.0*
1N3889		50	75	0.025*	3.0*	5.0*
1N3890		100	150	0.025*	3.0*	5.0*
1N3881		200	250	0.025*	3.0*	5.0*
1N3882		300	350	0.025*	3.0*	5.0*
1N3883		400	450	0.025*	3.0*	5.0*
*6FL5S02	6FL5S05	6FL5S10	50	75	0.050	—
6FL10S02	6FL10S05	6FL10S10	100	150	0.050	—
6FL20S02	6FL20S05	6FL20S10	200	275	0.050	—
6FL40S02	6FL40S05	6FL40S10	400	500	0.050	—
6FL60S02	6FL60S05	6FL60S10	600	725	0.050	—
—	6FL80S05	6FL80S10	800	950	0.050	—
—	6FL100S05	6FL100S10	1000	1250	0.050	—
*12FL5S02	12FL5S05	12FL5S10	50	75	0.050	—
12FL10S02	12FL10S05	12FL10S10	100	150	0.050	—
12FL20S02	12FL20S05	12FL20S10	200	275	0.050	—
12FL40S02	12FL40S05	12FL40S10	400	500	0.050	—
12FL60S02	12FL60S05	12FL60S10	600	725	0.050	—
—	12FL80S05	12FL80S10	800	950	0.050	—
—	12FL100S05	12FL100S10	1000	1250	0.050	—
**16FL5S02	16FL5S05	16FL5S10	50	75	0.050	—
16FL10S02	16FL10S05	16FL10S10	100	150	0.050	—
16FL20S02	16FL20S05	16FL20S10	200	275	0.050	—
16FL40S02	16FL40S05	16FL40S10	400	500	0.050	—
16FL60S02	16FL60S05	16FL60S10	600	725	0.050	—
—	16FL80S05	16FL80S10	800	950	0.050	—
—	16FL100S05	16FL100S10	1000	1250	0.050	—

## REVERSE RECOVERY CHARACTERISTICS

	1N3879 — 1N3883	6FL...			12FL...			16FL...			Unit	Conditions	
		S02	S05	S10	S02	S05	S10	S02	S05	S10			
t <sub>r</sub>	Max. reverse recovery time	150	150	110	285	490	100	250	430	90	225	ns	$T_J = 25^\circ\text{C}$ , $I_F = 1\text{ A}$ to $V_R = 30\text{ V}$ $dI/F/dt = 100 \mu\text{A}/\mu\text{s}$
		300*	300*	200	500	1000	200	500	1000	200	500	ns	$T_J = 25^\circ\text{C}$ , $dI/F/dt = 25 \mu\text{A}/\mu\text{s}$
I <sub>RM</sub> (REC)	Max. peak recovery current	4*	5*	—	—	—	—	—	—	—	—	I <sub>FM</sub> = $\pi \times$ rated $ I_F (\text{AV})$	
		400	350	230	1700	5000	200	1300	3800	150	1100	3000 nC	$T_J = 25^\circ\text{C}$ , $I_F = 1\text{ A}$ to $V_R = 30\text{ V}$ $dI/F/dt = 100 \mu\text{A}/\mu\text{s}$
Q <sub>RR</sub>	Max. reverse recovered charge	400	400	200	1200	5000	200	1200	5000	200	1200	5000 nC	$T_J = 25^\circ\text{C}$ , $dI/F/dt = 25 \mu\text{A}/\mu\text{s}$ $ I_{FM}  = \pi \times$ rated $ I_F (\text{AV})$
		400	400	200	1200	5000	200	1200	5000	200	1200	5000 nC	

## ELECTRICAL SPECIFICATIONS

	1N3879 — 1N3883	6FL...	12FL...	16FL...	Unit	Conditions	
<b>FORWARD CONDUCTION</b>							
I <sub>F</sub> (AV)	Max. average forward current	6*	6	12*	16	A	180° conduction, half sine wave, $T_C = 100^\circ\text{C}$
I <sub>F</sub> (RMS)	Max. r.m.s. forward current	9.5	9.5	19	25	A	
I <sub>FSM</sub>	Max. peak one-cycle non-repetitive forward current	72	110	145	180	A	$t = 10 \text{ ms}$
		75*	115	150*	190		$t = 8.3 \text{ ms}$
		85	130	170	215		$t = 10 \text{ ms}$
		90	135	180	225		$t = 8.3 \text{ ms}$
I <sub>2t</sub>	Max. $I^2t$ for fusing	26	60	103	160		$t = 10 \text{ ms}$
		23	55	94	150		$t = 8.3 \text{ ms}$
	Max. $I^2t$ for individual device fusing	36	88	145	230		$t = 10 \text{ ms}$
		33	78	130	210		$t = 8.3 \text{ ms}$
I <sub>2t</sub> √t	Max. $I^2\sqrt{t}$ for individual device fusing	363	856	1452	2290	$I^2\sqrt{t}$	$t = 0.1 \text{ to } 10 \text{ ms}$
		1.5*	1.5	1.5*	1.5	V	$T_J = 25^\circ\text{C}$ , $I_F = \text{rated }  I_F (\text{AV})$ (D.C.)
V <sub>FM</sub>	Max. peak forward voltage	1.4*	1.4	1.4*	1.4		$T_C = 100^\circ\text{C}$ , $I_F = \text{rated }  I_F (\text{AV})$
		1.5*	1.5	1.5*	1.5		

\*JEDEC registered value.

\*\*Suffix "SO2" may be omitted, i.e., 12FL10 implies 12FL10S02,

12FL60 implies 12FL60S02.

(1) I<sub>R</sub>(AV) @ rated  $|I_F|(\text{AV})$  and  $V_{RRM}$ , and  $T_C = 100^\circ\text{C}$ .(2) I<sub>R</sub> @ rated  $V_{RRM}$  and  $T_J = 150^\circ\text{C}$ .(3)  $I^2t$  for time  $t_X = I^2\sqrt{t} = \sqrt{t} \times \sqrt{V}$ 

(4) When these devices are ordered without a suffix, e.g., 40HFL, the order will be filled with devices that meet the SO2 specification.

(1) Types listed are cathode to case; for anode-to-case include "R" in code, i.e., 1N3879R, 6FLR20S10, 16FLR40S02.



## Thermal and mechanical specifications

		1N3879 -1N3883 6FL...	1N3889 -1N3893 12FL...	16FL...	Units	Conditions
T <sub>j</sub>	Junction operating temperature range	-65 to 150			°C	
T <sub>std</sub>	Storage temperature range	-65 to 175			°C	
R <sub>thJC</sub>	Maximum internal thermal resistance, junction to case	2.5	2.0	1.6	deg C/W	DC operation
R <sub>thCS</sub>	Maximum thermal resistance, case to heatsink		0.5		deg C/W	Mounting surface flat, smooth and greased.
T	Mounting torque to nut ±10%	10.5			lbf.in	Lubricated threads
		0.12			kgf.m	(Non-lubricated threads)
	Mounting torque to device	1.2			Nm	
		11.5 (13.5)			lbf.in	
wt	Approximate weight	0.13 (0.155)			kgf.m	
		1.3 (1.36)			Nm	
Case style		DO-203AA (DO-4)				JEDEC

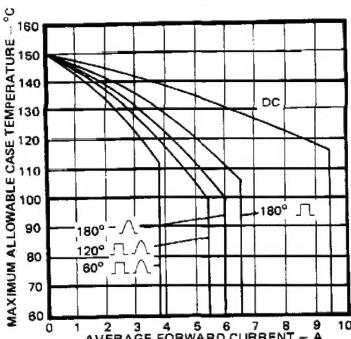


Fig. 1 — Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

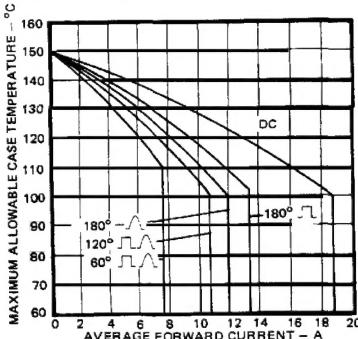


Fig. 2 — Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

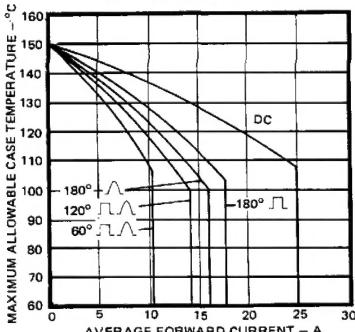


Fig. 3 — Average Forward Current Vs. Maximum Allowable Case Temperature, 16FL Series

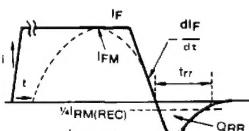
 $I_F$ ,  $I_{FM}$  = Peak forward current prior to commutation $-dI/dt$  = Rate of fall of forward current $I_{RM(REC)}$  = Peak reverse recovery current $t_{rr}$  = Reverse recovery time $Q_{RR}$  = Reverse recovered charge

Fig. 4 — Reverse Recovery Time Test Waveform

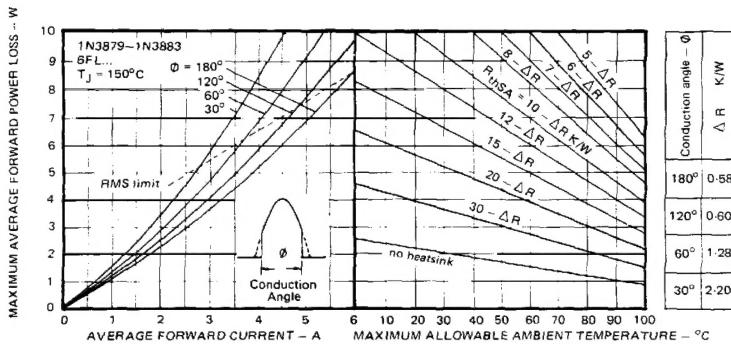


Fig. 5 – Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

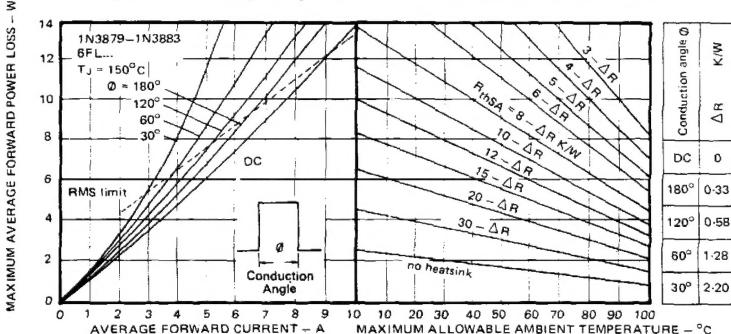


Fig. 6 – Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

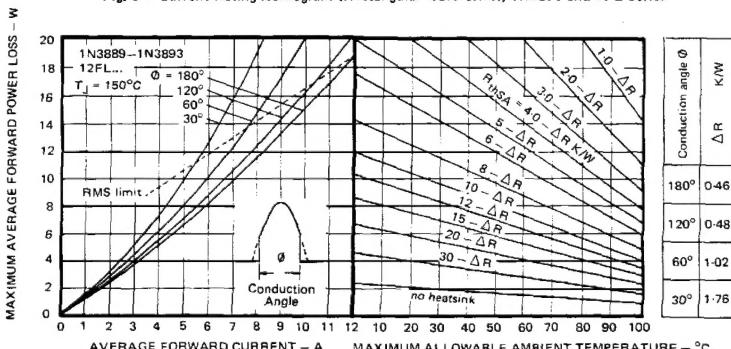


Fig. 7 – Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series

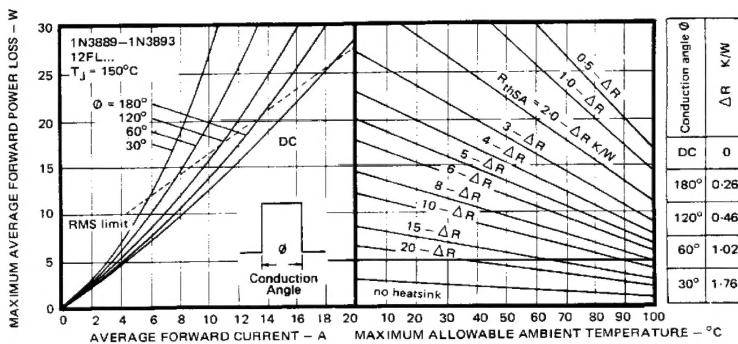


Fig. 8 — Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

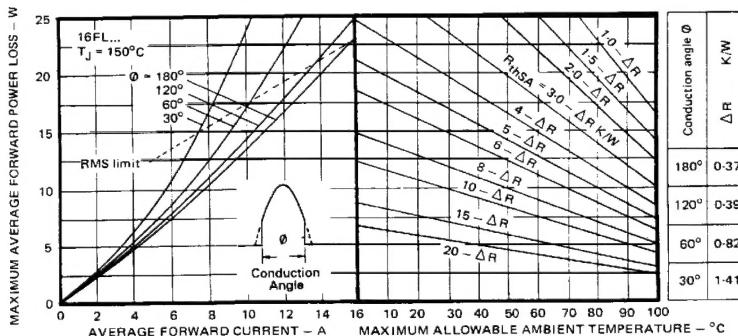


Fig. 9 — Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

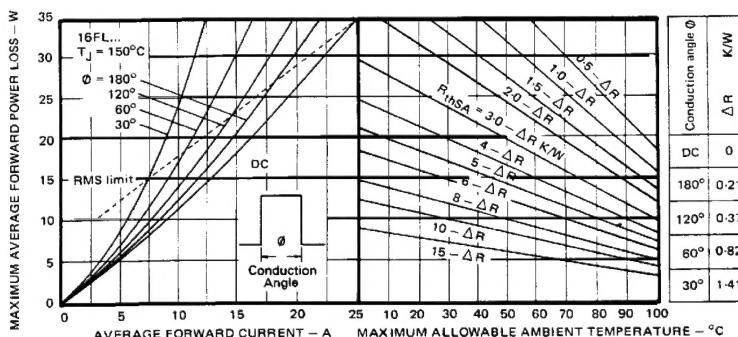


Fig. 10 — Current Rating Nomogram (Rectangular Waveforms), 16FL Series

**1N3879, 1N3889, 6FL, 12FL, 16FL Series**

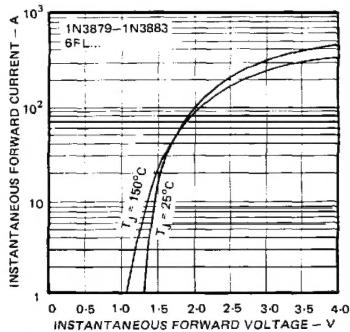


Fig. 11 — Maximum Forward Voltage Vs. Forward Current, 1N3879 and 6FL Series

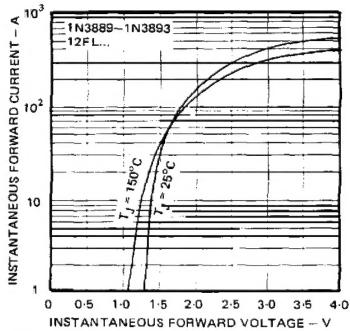


Fig. 13 — Maximum Forward Voltage Vs. Forward Current, 1N3889 and 12FL Series

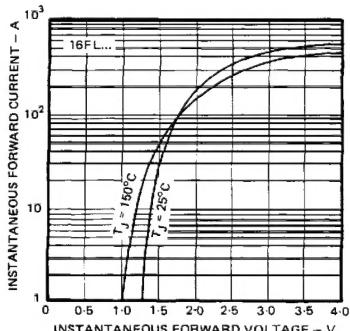


Fig. 15 — Maximum Forward Voltage Vs. Forward Current, 16FL Series

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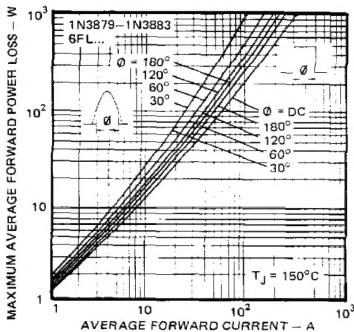


Fig. 12 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3879 and 6FL Series

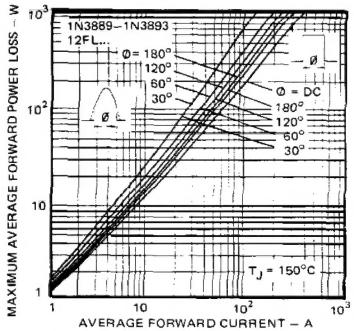


Fig. 14 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3889 and 12FL Series

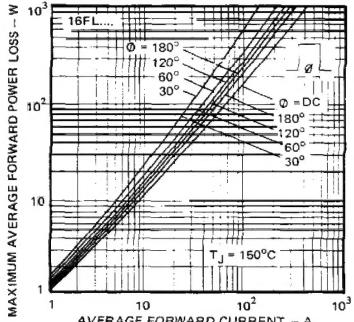


Fig. 16 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 16FL Series



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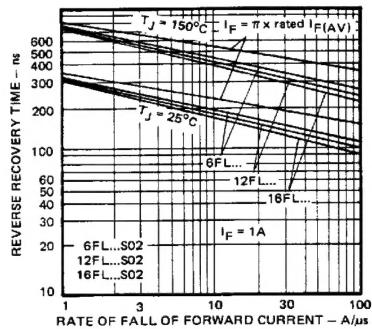


Fig. 17A — Maximum Reverse Recovery Time Vs.  
Rate of Fall of Forward Current, All Series \_S02

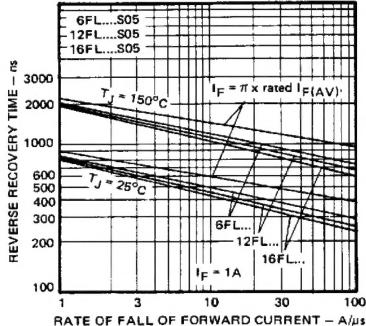


Fig. 18A — Maximum Reverse Recovery Time Vs.  
Rate of Fall of Forward Current, All Series \_S05

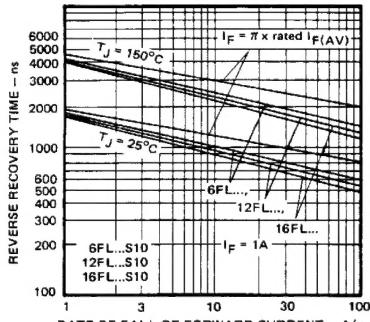


Fig. 19A — Maximum Reverse Recovery Time Vs.  
Rate of Fall of Forward Current, All Series \_S10

**1N3879, 1N3889, 6FL, 12FL, 16FL Series**

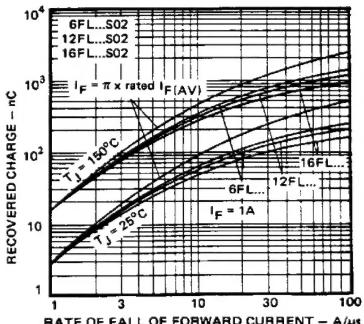


Fig. 17B — Maximum Recovered Charge Vs. Rate of  
Fall of Forward Current, All Series \_S02

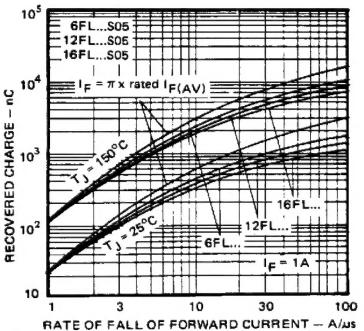


Fig. 18B — Maximum Recovered Charge Vs. Rate of  
Fall of Forward Current, All Series \_S05

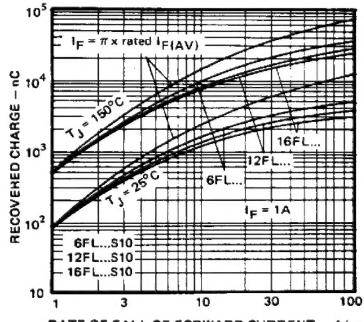


Fig. 19B — Maximum Recovered Charge Vs. Rate of  
Fall of Forward Current, All Series \_S10

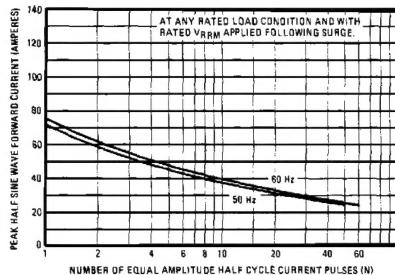


Fig. 20 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3879 Series

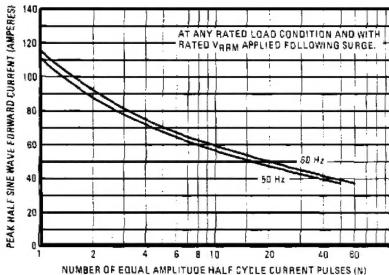


Fig. 21 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 6FL Series

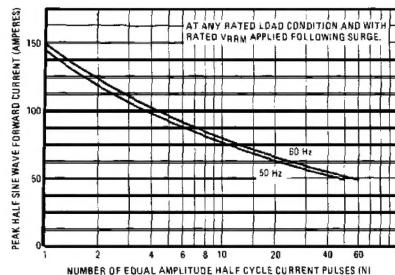


Fig. 22 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3889 and 12FL Series

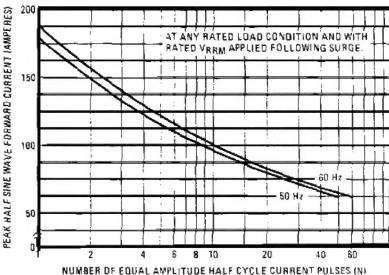


Fig. 23 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 16FL Series

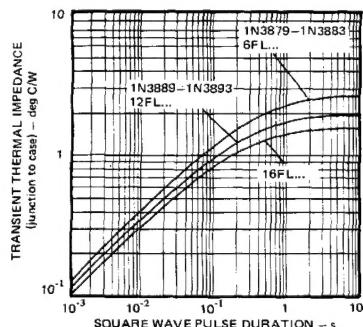


Fig. 24 — Maximum Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration, All Series.